

Looking Back at Social Discount Rates: The Influence of Papers, Presentations, Political Preconditions and Personalities on Policy

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Introduction

The long-term is becoming more important. This is the conclusion suggested by changes to official guidance for discounting in project and policy appraisal in the United Kingdom (HMT, 2003), France (Lebègue, 2005) and Norway (Hagen et al, 2012), among others.¹ In these countries, the discount rate applied to costs and benefits in the distant future is lower than the discount rate applied today; a declining discount rate (DDR) is employed. These policy changes have had real-world consequences.

These developments follow advances in the theory of discounting (e.g. Gollier, 1997, 2002a,b, 2004; Weitzman, 1998) that had previously remained largely untouched since the initial formalisations of Samuelson (1937) and Koopmans (1960; 1972). Over the past couple of decades, new ideas in discounting have been developed, deployed and diffused unlike ever before. The all-too-frequent gap between the “supply” of ideas from academics and the “demand” for those ideas by the policymakers appeared to close, at least momentarily.

It is tempting to conclude that such policy changes represent a triumph of the application of economic theory within governments. Is such a conclusion warranted? What, if anything, is there to learn from this experience for the application of economic theory in other domains? Our hypothesis motivating this paper is that the changes to discounting guidance, in which both of us were personally involved (Oxera, 2002; Pearce et al. 2003), were brought about through the combined influence of key papers, presentations, political preconditions and sometimes personalities. Teasing out the different key contributions in this non-linear and uncertain process is not straightforward. But if economists are interested in the process of

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We are grateful to the dozen experts and officials (see Appendix 1) for their participation in interviews for this paper. We thank participants at the Department of Geography and Environment/Grantham Research Institute memorial conference for David Pearce held in September 2015, and all the participants of discounting policy panel session held at EAERE 2016 in Zurich for lively discussion and helpful comments. In particular we express gratitude to the co-presenters Phoebe Koundouri, Christian Gollier and Aart de Zeeuw. We also thank but do not implicate Richard Perkins for his review of an earlier draft. Finally we express our gratitude to Ed Barbier, Ian Bateman and David Simpson for encouraging us to pursue this paper.

¹ In 2013, the Danish guidelines were updated in line with the Norwegian guidelines for instance: <https://www.fm.dk/nyheder/pressemeddelelser/2013/05/ny-og-lavere-samfundsoekonomisk-diskonteringsrente>

enslaving ‘practical men’ prior to becoming defunct (Keynes 1936), understanding how new economic ideas are translated into policy change and real-world impact is important.

There is a substantial academic literature on the process of policy change. One leading concept is the “policy entrepreneur” (Mintrom, 1997). This is a motivated individual who identifies policy problems, creates solutions and then persuades and organises other individuals to implement those solutions. Another notion is the “advocacy coalition” framework (Sabatier, 2006), in which coalitions of individuals with different roles (researchers, interest group leaders, civil servants and elected officials) but with shared beliefs coordinate to achieve change that is in their interests. The notion of the “policy window” (Kingdon and Thurber, 1984), in which the time is right for policy change is relevant. So too is the often slippery concept of power. It is frequently argued that power stems from *expert* knowledge (e.g. Foucault 1991), but can also emanate from the charismatic authority of individuals, or rational-legal authority where institutional structures are more important than individual personalities (Waters and Waters 2015). Finally, “policy transfer” (Dolowitz and Marsh, 2000) across jurisdictions also matters.

As economists, though, it is perhaps inevitable that we see the process of public policy change as involving the forces of supply of and demand in an “as if” market for ideas. R&D provides the supply of new ideas, delivered in papers and presentations. Political preconditions dictate demand for an idea at a given point in time. And, most vitally, energetic and persuasive personalities can be important for overcoming barriers that prevent the ideas market from operating efficiently. Arguably, these personalities have power in the form of expert knowledge and legitimacy.²

We parse the foregoing theoretical frameworks using this economic lens. Demand for policy solutions might incentivise the supply of new research. Equally, supply-side ‘breakthroughs’ in academic research can subsequently drive policy change. And, in any market without an institutionalised exchange, brokers and other intermediaries (e.g. “policy entrepreneurs”) bring together demand and supply to close the deal. We stress that such ideas markets are not necessarily efficient; good ideas can be underprovided and bad ideas overprovided, and market manipulation by policy entrepreneurs is possible (Kingdon, 1995). In the case of discounting, the interviews conducted for this paper suggests a very important role of the broking function. In some countries, formal institutions serve this purpose. In most countries, however, such institutions are weak or absent, and the trade in ideas is informal and heavily intermediated by individual brokers. These individuals often straddle the academic/R&D and policy sphere, and can make timely presentations and other interventions to key influencers. Sometimes NGOs and think-tanks take on this role. A combination of these intellectual intermediaries, along with demand and supply-side dynamics, influence any given policy change, but a key conclusion of this study is that all three components are necessary conditions for change, without any one being sufficient.

This paper explores changes in discounting policy over the last 15 years. We draw selectively upon these theories of policy change, personal experience, historical communications, and semi-structured interviews with a dozen key policy actors (see Appendix 1). We attempt to explain the specifics of the policy changes, the balance of demand- and supply-side factors, and the role of papers, presentations, political preconditions and personalities. We draw some general but modest conclusions on the process of public policy change.

² Similar ideas are to be found in the work of Braun (2009) in analysing the birth of the European emissions trading system for carbon.

The next section examines the initial theoretical insights that led scholars to develop and refine the notion of DDRs in the 1990s and 2000s. In the third section, we examine the initial “deployment” of this new DDR “technology” in the United Kingdom by Her Majesty’s Treasury (HMT, 2003). We use insights from interviews to ascertain why theory developed primarily by an American and a Belgian saw the first light of day in England. The fourth section charts the diffusion – or policy transfer – of the “technology” across a range of other countries – some of which (including the USA) explicitly decided not to change guidance and to remain with a constant rate over time. The final section briefly reviews the impact in practice, rather than in theory, that these changes have had on the real economy, and concludes with lessons for economists in other areas of policy making.

The R&D phase in the United States and France

Theoretical research

This section charts the supply of ideas that influenced discounting policy. We define the ‘influence’ of ideas with reference to three distinct and sometimes overlapping criteria: 1) articles cited in the government guidelines on DDRs; 2) articles or authors routinely referred to by interviewees; and, 3) articles on social discounting and DDRs considered to be foundational. Table 1 provides some summary measures of influence for key articles. We refer to the period during which these articles were published as the R&D phase.

The R&D phase arguably began in the 1950s and 60s as governments began to use cost-benefit analysis to examine investments in major infrastructure (water, energy and transport). Inevitably, the results of such analyses were highly sensitive to the discount rate, and research on discounting took off (e.g. Feldstein, 1964). Major contributions of this era were subsequently published by Resources for the Future (RFF) as Lind (1982a). The conclusion of the opening chapter (Lind, 1982b) was that the appropriate discount rate for such long-term projects should reflect the shadow cost of public capital.

Lind (1982a) was the go-to reference on social discounting until RFF held another symposium on social discounting and *inter-generational equity*, leading to an edited volume (Portney and Weyant, 1999) with chapters on a wider range of questions: Schelling (1999) considered ethical trade-offs within and between generations, and Arrow (1999) framed public investment as an inter-temporal game. The question of whether the discount rate should be constant for distant time horizons was also addressed.

Empirical evidence on individual hyperbolic discounting (Cropper et al 1994; Cropper and Laibson 1999) accorded with experimental and observational studies from economic psychology and evolutionary biology (Ainslie 1992, Thaler 1981, Frederick et al. 2002). Despite not being directly relevant to *social* discount rates, behavioural economic concepts and empirics alerted academics and practitioners to the phenomenon of non-exponential individual discounting (Loewenstein and Prelec 1992). The rational agent model was challenged by present-biased discounting describing loss of self-control, addiction, procrastination and time inconsistency. If social welfare should reflect the preferences of the population, these observations indicated that standard discounting practices might need revision (Henderson and Bateman, 1995).

Despite efforts to connect the micro and the macro (e.g. Laibson 1997, Barro, 1999), ultimately this behavioural economics literature was not decisive. Obvious questions arose as to whether a behavioural theory that explained irrational behaviour was a suitable for

government guidance (Henderson and Bateman, 1995). Furthermore, the time horizons over which these behavioural phenomena were typically observed were measured in days and weeks, not years or decades (Frederick et al., 2002).

Instead, a more reassuring literature on the term structure of interest rates had the greatest influence on discounting policy. Theoretical work by Christian Gollier at Toulouse and Martin Weitzman at Harvard was highly influential. Their work is heavily cited by government guidelines (IAWG 2010, HMT 2003, Hagen et al. 2012, USEPA 2010), and academic work (See Table 1).

In particular, Weitzman (1998, 1999) argued that planners should use a declining term structure of social discount rates when the discount rate itself is uncertain, based on a highly ‘stripped down’ model. His straightforward formal exposition and empirical applications meant that these ideas became very influential.

In fact, though, there is only limited theoretical support for Weitzman’s argument. It is not clear, for instance, why the expected net present value criterion (ENPV), which is central to his idea, is a natural welfare criterion. Weitzman’s approach is a special case of the standard theoretical literature (e.g. Gollier and Weitzman 2010).³ In contrast, Gollier (2002a,b) began from the theory of asset pricing, extending the seminal contribution of Lucas (1978). While Weitzman (1998) argued definitively for DDRs, Gollier (2002a, 2002b) isolated the conditions on growth uncertainty and the risk preferences of the representative agent that would lead to different term structures. This included DDRs, which were shown to stem from a precautionary motive for saving that increases rapidly with the time horizon.

Gollier’s research was triggered by a request from the French government to evaluate public investments in Nuclear Power. With decommissioning horizons of 150 to 1000 years, a precise theory of the appropriate social discount rate was necessary. While considerably more technical than Weitzman (1998), Gollier’s two papers also strongly influenced the 2003 update to the UK Green Book, as evidenced by citations and qualitative evidence from interviewees.

[Insert Table 1 around here].

Empirical research

Changes to policy guidance typically require empirical evidence. Using a time series interpretation of Weitzman (1998), Newell and Pizer (2001; 2003) calibrated uncertainty in discount rates using the historical (200 year) time series of risk free interest rates in the US, and estimated a term structure of DDRs. Subsequent papers applied the same framework but alternative empirical models to the US interest rate data, with extensions to the UK and other OECD countries (Groom et al. 2004; 2007; Hepburn et al. 2008).

An important and controversial contribution to empirical research was the “Gamma Discounting” proposal of Weitzman (2001) which surveyed 2000+ experts on the appropriate “interest rate” to discount climate change projects. The expert opinions (mean 4%, standard deviation 3%, range -3% to 27%) were used to proxy uncertainty in the discount rate and calculate the certainty equivalent. The resulting term structure declined from 4% to 1% for horizons of 300 years. There remain numerous concerns about gamma

³ Freeman and Groom (2016) and Gollier (2016) discuss the theoretical motives of Weitzman (1998). See also Cox, Ingersoll and Ross (1981). A survey of contributions at the time can be found in Groom et al. (2005).

discounting (Freeman and Groom 2015; Heal and Millner 2013; Gollier 2016), yet its simplicity contributed to its policy influence.

In summary, the R&D phase provided the supply of important new ideas about discounting. This phase was dominated by two scholars, Weitzman and Gollier, although many others made contributions (see Groom et al, 2005 for a summary). It would be a mistake, however, to see the supply of new ideas about discounting as completely exogenous. Rather, these ideas were triggered by long-term policy questions — climate change mitigation and adaptation, and nuclear power — that were highly sensitive to the discount rate. In this policy arena, the limitations of standard discounting theory were plain to see.

Deployment in the United Kingdom

In 2003, HMT implemented two major changes in discounting guidance for government departments in the updated “Green Book”⁴. First, the headline discount rate was reduced from 6% to 3.5%. Second, DDRs were introduced, declining step-wise to 1% (forward rate) for horizons of 300 years or more (see Figure 1a).⁵

[Insert Figure 1 around here]

There was no guarantee *ex ante* that these changes would occur. Various obstacles had to be overcome. Change was dependent on the prevailing political conditions (demand), the important papers discussed in the previous section (supply) and, importantly, some key personalities (brokers).

On the demand side, interviewees involved in the Green Book update suggest that changes to discounting guidance depended upon the prevailing political winds. The recession of the early 90s and the austerity measures of the Major government led to concerns about the state of UK infrastructure by civil servants and politicians alike. From 1997 onwards, the new Blair government was concerned about modernisation and productivity, and these terms appeared repeatedly in speeches on the economy.⁶

Some civil servants were concerned that Green Book discounting discriminated against public projects with long-term objectives, including increasing productivity. First, despite specific guidance suggesting the contrary (See HMT 1997, Annex G, paragraph 4), it was widely believed in government departments that the 6% discount rate contained a premium for so-called ‘optimism bias’⁷. Second, there was concern that the 6% discount rate was

⁴ This is formally the document entitled “The Green Book: Appraisal and Evaluation within Central Government” (HMT 2003). It is incumbent upon all government departments to follow the guidance.

⁵ The full schedule: for horizons $H=[30, 75, 125, 200, 300]$ the period to period discount rate is [3%, 2.5%, 2%, 1.5%, 1%].

⁶ See e.g., Labour Party Conference Speeches by Tony Blair as Prime Minister in 1997 (<http://www.britishpoliticalspeech.org/speech-archive.htm?speech=203>) and 1999 (<http://www.theguardian.com/politics/1999/sep/28/labourconference.labour14>).

⁷ This erroneous belief could have stemmed from HMT (1997) Appendix to Annex B, paragraph 19, entitled “Rough and Ready Techniques”. The clearest guidance on the origins of the 6% can be found in paragraphs 6-15 in the Appendix to Annex G of HMT (1997).

simply too high, being at the upper end of estimates for risky projects. While the concerns of civil servants were technical, the political backdrop gave them greater prominence.

An internal 'task force' was commissioned by HMT in 1998 to examine Green Book discounting guidance. The task force aimed to: 1) clarify the separation of optimism bias from the discount rate; 2) specify the parameters of the social rate of time preference, and 3) address discounting for long-run projects.

Between 1998 and 2001, the task force became aware of the literature on DDRs, in particular papers by Weitzman, Gollier and Newell and Pizer, along with an influential working paper by David Pearce and David Ulph (1995). The Green Book review had political implications. Trade unions were concerned that the update would facilitate further privatisation. Supporters of Private Finance Initiatives (PFIs) were concerned that the review would militate against PFI projects. To the Blair-Brown government, each represented an important constituency.

Input from academics was crucial to navigating these opposing concerns. Evidence-based policy making was the guiding principle. The Government task force was concerned with ensuring that updates to the Green Book were backed by convincing theory and robust empirical evidence.

One of the most influential brokers of the demand and supply sides in United Kingdom was Professor David Pearce. Pearce had served as the chief advisor on environment to the Thatcher government. He had a strong network in government and a research team – the Centre for Social and Economic Research on the Global Environment (CSERGE) – at the Department of Economics, University College London. Given his long-standing interest in CBA and social discounting, Pearce began to cultivate understanding of the latest discounting theory within government spending departments, particularly with their Chief Economists.⁸

In 2002, Pearce invited Gollier to present his work on social discounting to the department of economics at UCL. Members of CSERGE attended this seminar and subsequently summarised Gollier's arguments for DDRs alongside the contributions from Weitzman (1998; 2001).

Pearce knew that the Green Book update would need to meet the requirements of 'evidence-based policy making'. He proposed that Oxera, a consultancy that worked closely on government policy, provide an expanded review of the evidence on DDRs. This was funded by the (now defunct) Office of the Deputy Prime Minister (ODPM) and the Department of Environment, Food and Rural Affairs (DEFRA). The funding structure ensured the buy-in of the civil service while keeping politicians at bay.⁹ In addition to the papers by Weitzman and Gollier, the 2002 Oxera study reviewed papers from other strands of economics, and illustrated the implications of DDRs for public investments such as flood defences, nuclear power, the social cost of carbon and transport.

Some departments opposed DDRs. For instance, the Department of Health (DOH) was concerned that projects with infinitely long-lived payoffs, e.g. eradication of disease, would provide an infinite present value if the long-horizon discount rate was lower than the rate at which the relative price of health benefits increased, a standard DOH assumption. These

⁸ David Pearce's formidable contribution to national and international environmental policy in general, and his considerable capacity as a policy broker, was summarised after his death in 2005 by Convery (2007).

⁹ The project fee was £20,000, shared equally between ODPM and DEFRA. £10,000 was regarded as the upper limit of funding beyond which the involvement of ministers would have been likely. Interviewees were divided as to whether sharing funding was explicitly designed to keep the project under the political radar.

fears were allayed by the academics and consultants involved in the report, including at a special meeting of departmental Chief Economists. The draft government guidelines, which followed the recommendations of Oxera (2002), were made public early in 2003.

Government officials recall that in the aftermath of the new Green Book there were no major criticisms. Neither the trade unions nor the PFI advocates objected. Our interviewees agreed that the evidence base collected in the Oxera report was important, even pivotal, in generating agreement and fending off objections.

The new guidelines have passed the test of time. In 2013, HMT held a workshop in which evidence on discounting from the previous decade was presented to representatives from various government departments. Academics, including Christian Gollier¹⁰, presented research corroborating previous results. This strengthened the position taken in the existing guidance and led to DDRs being retained in the Green Book. Figure 2 shows the sequence of events in terms of policy changes, policy documents and the critical academic work.

In summary, the necessary conditions for the 2003 Green Book changes included the political demand, the supply of a defensible idea developed by reputable economists, and an energetic and shrewd broking of the two sides of the ideas market. In the UK in 2003, the broker – Professor Pearce – built a case for change that overcame inertia and opposition. The test of ‘evidence-based policy making’ was met by asking a consultancy respected by government to compile the best scholarship. The Green Book heavily cites the Oxera report along with the scholarly papers of Weitzman and Gollier. The ‘Weitzman effect’ is how many UK practitioners articulated the rationale for DDRs, despite correspondence at the time demonstrating some scepticism of the generality of Weitzman (1998, 2001). Ultimately though, the result was little room for objection. And so the UK became the first government with formal guidelines that differentiated between the long-term and the short-term, via the discount rate term structure.

[Insert Figure 2 around here]

Policy Diffusion

Following the changes to discounting guidance in the United Kingdom, similar changes occurred elsewhere. This section asks whether these policies were triggered domestically, or were the result of “policy diffusion” across jurisdictions, and if so, how?

Interviewees in the United Kingdom thought the international reputation of the Green Book was “highly” or “extremely” important in raising the profile of DDRs as a policy choice. For instance, the experience in the United Kingdom was highlighted and shared by the Organisation for Economic Development and Cooperation (OECD) at an international meeting of finance and environment officials (Hepburn, 2007). And many governments from lower- or middle-income countries visit HMT to build capacity in public expenditure management.

However, due to the likely bias in the views of our UK-based interviewees, we interviewed officials from two countries where DDRs have been adopted – France and Norway – and two

¹⁰ Mark Freeman (Loughborough), David Maddison (Birmingham), Antony Millner (LSE) and the authors of this paper. Their contributions include Freeman (2010), Heal and Millner (2013) and Groom and Maddison 2013. See: <http://www.lse.ac.uk/geographyAndEnvironment/News%20archive/GreenBook.aspx>

where DDRs have not – the Netherlands and USA. Our conclusion from these interviews is that the United Kingdom Green Book was one important part of the policy diffusion process.

France

Declining discount rates emerged next in France, over a series of three government reports by Lebègue (2005), Gollier (2010) and Quinet (2013). Lebègue (2005) introduced DDRs for risk-free projects, Gollier (2010) extended the framework to risky projects, and this was put into practice by the parameters adopted by Quinet (2013). Two notable features emerge from this experience and our interviews. First, the relevant decisions were influenced by Christian Gollier as much because of the strength of his personality as the power of his economic theory. Second, the agreed guidelines represent pragmatic and political compromises between different interests, reached behind doors that were largely closed to academic experts.

In 2005, guidance on *risk-free* projects promulgated by the French Commissariat générale du Plan incorporated forward rates that fall from 4% to 2% after 30 years (Lebègue 2005), as shown in Figure 1b. The theoretical argument for DDRs, subsequently published by Gollier (2008, 2012), is that persistent shocks to growth increase future uncertainty such that the precautionary motive for saving increases with the time horizon. This theory lacks the algebraic simplicity of Weitzman, but the intuition is clearer. The French guidelines refer to the Ramsey Rule (Ramsey, 1928), extended to incorporate persistent growth shocks. The eventual guidelines and parameter values represent a pragmatic compromise of various ethical and practical positions (Lebègue 2005, p 102), and reflect discussions between governmental departments, such as energy and transport, and representatives from trade unions.

How important was the experience in the United Kingdom to Lebègue (2005)? Given the French government benefitted directly from Gollier's advice on the theory, and adopted a pragmatic approach in practice, it is reasonable to doubt that there was much influence. However, Lebègue (2005) favourably cites the Green Book as an exemplar in relation to DDRs (Lebègue 2005, p 46). Our interviewees also suggest that the experience of the United Kingdom provided a helpful precedent for the French to adopt DDRs in principle.

This was put into practice in two stages. First, in 2010, under the Sarkozy government, the French Centre d'Analyse Stratégie (CAS, formerly the Commissariat du Plan) updated discounting policy to preserve DDRs and extend guidance to cover *risky* projects (Gollier 2010). These recommendations were not implemented because the project betas had not yet been reliably estimated. For instance, some project betas in transport were estimated to be as high as 4, implying a discount rate of over 8% and hence very little investment in transport. So, in 2013, under the Hollande government, the "Quinet Report" to the CAS acknowledged project risk in line with the Gollier report, but recommended a lower beta and risk premiums rooted alternative calibrations of CCAPM theory to those using observed market rates.¹¹ This process represented a pragmatic and, most likely, politicised compromise between theory, empirics and the interests of departmental lobbies.

United States

The prospect of DDRs in the USA emerged around 2010, when the US Interagency Working Group (IAWG) updated guidance on the appraisal of government projects under executive

¹¹ Furthermore, new theoretical results subsequently published in Gollier (2012) and Gollier (2016), shifted the focus of the guidelines to the term structure of the project risk premia.

order 12866. The new guidance ultimately specified that “intergenerational projects” should be subjected to a flat discount rate of 2.5% for their duration (IAWG 2010; Sunstein 2014). By comparison, general guidance on regulatory analysis is to employ a flat discount rate of 7% (for projects displacing private capital) or 3% (if displacing consumption), as set by Office of Management and Budgets Circular A-4 (OMB 2003), which refers to Circular A-94 relating to CBA of Federal programmes (OMB 1972, and updates).

The IAWG (2010) process was triggered by the need to evaluate ever more intergenerational projects. Specifically, the IAWG was focused on the Social Cost of Carbon (SCC), illustrated by Appendix 15 and 16a which spell out requirements for evaluating carbon emissions using the SCC (IAWG 2010). The focus on the SCC was partly driven by the analysis of the Corporate Average Fuel Efficiency (CAFE) standards (USEPA 2010).

The IAWG (2010) recommendations were heavily influenced by the academic literature on DDRs. Weitzman (1998, 2001) and Newell and Pizer (2001, 2003) are prominently cited, as are the empirical papers by Groom et al. (2007) and Hepburn et al. (2008). Indeed the flat 2.5% rate is a straightforward compromise between two of the time series interest rate models (AR1 mean reverting and random walk) presented by Newell and Pizer (2003) (See Figure 1d).

Academics such as Newell and Pizer played an important role. Pizer was a senior economist on the President’s Council of Economic Advisers and previously a research fellow at RFF. Newell was a senior research fellow at RFF. The ‘revolving door’ between academia, think tank (e.g. RFF) and government is quite common among environmental economists in the US. An important institutional mechanism here is the Intergovernmental Personnel Act (IPA), which places academicians in government positions for 2 year periods. Newell and Pizer were both at Duke University and both joined this scheme, as were other prominent environmental economists, such as Michael Greenstone, Elizabeth Kopits and Joe Aldy, who were pivotal in ensuring that the SCC became part of CBA guidelines.

Is there any evidence of policy diffusion from the United Kingdom? The Green Book is cited in the IAWG and USEPA guidelines as an exemplar in this area (e.g. USEPA 2010, Ch 6, p16-17; IAWG 2010a, p23), as is Oxera (2002), Pearce et al, (2003) and Groom et al. (2005). Yet Pizer himself influenced the Green Book changes through interviews with the team working on the Oxera (2002) report. Other interviewees confirm that the influences on policy ran in both directions across the Atlantic.

Another attempt to change US guidelines was made in 2011, following concerns that the 2.5% flat rate would apply to costs and benefits at all points of time solely because of the inter-generational horizon of the project or regulation. On behalf of the USEPA and the OMB, Maureen Cropper organised an expert panel/workshop on the topic of intergenerational discounting and DDRs at RFF in Washington.¹² The panel concluded that the use of DDRs, as in France and the UK, would harmonise the treatment of costs and benefits.

The conclusions of the workshop were reported directly to OMB and USEPA officials, and disseminated by Arrow et al (2013; 2014). This was followed in 2014 by a high-level policy session at the American Economic Association meeting in Philadelphia. Kenneth Arrow served as discussant and papers extolling the virtues of DDRs were presented (e.g. Cropper et al. 2014, Gollier 2014). Yet the paper by Cass Sunstein, who was responsible for convening

¹² A detailed account of the charge questions can be found here: http://www.rff.org/files/sharepoint/Documents/Events/Workshops%20and%20Conferences/110922-Discounting/Charge_Questions_to_the_Committee.pdf

the IAWG on the SCC, asserted that benefits of changing discounting policy did not exceed the internal institutional and political costs. The tenor of the article is summed up by a paraphrased closing statement: ‘if it ain’t badly broke, don’t get anywhere near it’ (Sunstein 2014, p 55).

Discounting guidance remained unchanged, despite the RFF workshop and compelling expert opinion. While the Green Book is cited, our interviewees noted the British and French precedent was not decisive in making the argument for DDRs in the US. So, the supply and demand sides have, thus far, been left wanting by the apparent difficulty of broking the US ideas market and its large transactions costs. Nevertheless, the National Academy of Sciences committee on the SCC reported in January of 2017 and raised the issues of DDRs once again (NAS 2017, CH6). So DDRs remain live and policy relevant, despite the inertia.

Norway

In 2011, an expert committee was commissioned by Royal Decree in Norway to review guidance on cost-benefit analysis, including discounting. This was a reaction to two perceived problems. First, as in France, the recommended practice of tailoring the systematic risk of large projects (according to CAPM) allowed too much discretion and failed to deliver results that were considered satisfactory. Second, there were doubts about whether long-term projects were properly evaluated with a constant discount rate over time, given the developments in the literature.

The expert commission reported directly into the Ministry of Finance, illustrating strong channels of engagement between government and academe. The chair of that committee, Professor Kåre Hagen, convened a meeting of domestic and international experts at NHH Bergen in May 2012. Academics at this meeting¹³ were playing a role in diffusing policy experience from one country to another.

The UK experience was discussed — both of us were partly invited because of our experience with the Green Book. The consistency of the proposed guidance in Norway with the UK Green Book was considered “reassuring”. While the UK experience was not the trigger for the change, this “reassurance” played a role in the policy diffusion process.

¹³ Invited experts included Weitzman, Gollier and both authors, among others. See <http://nyttekost-web.sharepoint.com/Pages/default.aspx>.

The Netherlands

Guidance on CBA in the Netherlands is reviewed on a seven year cycle. The most recent review, in 2014-5, included a commission on discounting. The process included presentations by three invited external experts on discounting to the Ministry of Finance.¹⁴ The technical report CPB (2015) submitted to the government had a clear summary of the literature on DDRs up until 2015, including Gollier (2014; 2015). The UK Green Book is cited as standard practice. Following this process, the Netherlands Ministry of Finance accepted, in principle, the validity of a declining risk free discount rate, based on uncertainty in growth.

Nevertheless DDRs were not recommended by the Ministry of Finance, because the real interest rate was already 0% and a decline to negative risk free rates was considered problematic. With a time invariant risk premium of 3%, a discount rate of 3% was recommended for the appraisal of all government projects. CPB (2015) asserted that there is insufficient information available to determine the term structure of the risk premium, and there are too many difficulties in establishing project-specific discount rates. So, a flat term structure of 3% was recommended. DDRs were not adopted in practice, but the “dual discounting” literature (e.g. Weikard and Zhu 2005, Hoel and Sterner 2007), which emphasises rather the changing relative scarcity of environmental goods compared to consumption, was internalised. The Netherlands Environmental Assessment Agency is now undertaking research to formalise changing relative prices in CBA guidance.¹⁵ In fact, this approach builds upon previous guidance which already recommended that environmental goods be treated differently in CBA, but for reasons related to risk.

Policy change in the Netherlands appears to be less reliant on entrepreneurial ideas brokers. For each review, the Central Planning Bureau (CPB) – an independent body comprising expert economists – provides advice to the Ministry of Finance. Other independent bodies participate, including the Netherlands Environmental Assessment Agency (EAA). Their researchers have a high level of academic training, were aware of the literature, and assimilated it into guidance. There was no need for an external consultancy, as in the UK. In short, well-defined institutions met the broking requirement, reducing the need for charismatic policy entrepreneurs.

¹⁴ Christian Gollier, Mark Freeman and Ben Groom were invited as external experts. Also present were several academics from the Netherlands including Aart de Zeeuw, Rob Aalbers (CPB) and Herman Volleburgh (EAA).

¹⁵ The commission was influenced by Baumgartner et al (2014) and Drupp (2016), who built on Weikard and Zhu (2005), and Hoel and Sterner (2007).

Conclusion

The successful deployment and dissemination of DDRs suggests that, for better or worse, academic economists can enslave practical men with economic ideas. There are three main lessons about the demand and supply sides of this process.

First, there are three necessary conditions for advances in economic theory to find their way into policy. First, the “supply” of an idea from an academic economist must be of a reasonable quality. Nobel Prize-winning ideas are not always necessary. Yet government gatekeepers must find the ideas “persuasive” so that policymakers can feel confident that the academic work is “sound”, and they will not lose their jobs from deploying a flawed economic idea (Leaver, 2009). They feel particular comfort from the perceived quality of the *authors* as much as the quality of the *work*. Ideas from “outstanding academic economists” are more likely to be incorporated into policy. Such academics convey legitimacy and have authoritative or charismatic power in the sense of Foucault (1991).

Second, the “demand” for the idea must be strong. Political preconditions enable the policy window to be opened (Kingdon and Thurber, 1984). Existing theories and evidence represent potential solutions. They will be applied when the prevailing political agenda (e.g. productivity) values them most.

Finally, a sufficiently energetic and influential policy entrepreneur (Mintrom, 1997) can play the critical broking role. This role goes beyond that of a broker in a conventional goods market. It is not simply a process of connecting the supply with the demand and facilitating a transaction. The policy entrepreneur must be able to “blast through” the inertia and status quo bias of government processes and institutions and make a difference (Convery 2007, Sunstein, 2014). In the US, environmental non-governmental organizations often play a key role in overcoming inertia and converting ideas into policy. Examples include the adoption of catch shares (giving property rights to fishermen in the stock of fish) in the US, advanced by the Environmental Defense Fund, and the ‘beyond coal’ campaign by the Sierra Club

There are five lessons for academics. First, if policy impact is the objective there are diminishing marginal returns to the *quality* of supply. Outstanding questions and rigorous answers clearly matter, but these alone do not trigger change.

Second, sometimes the time is not right for an idea to become policy. Therefore, academics looking for policy impact need to be patient. It may be decades before an idea takes hold. But ideas matter – they are the cogs that drive history (Grayling, 2009). Furthermore, when a policy window opens, the time might be right for an old idea to remerge from hibernation, blinking into the light and scrutiny of government processes. The way the Netherlands adopted dual-discounting is a good example: it is not a new idea, it has just been waiting on the beach to catch the next “big wave” (Kingdon 1995, p165).

Third, there can be a policy payoff for academics whose ideas are connected to energetic and influential policy entrepreneurs. This may or may not require the academic to cultivate direct relations with the policy entrepreneur. In some cases, an academic – such as David Pearce in the UK – is able to play that role directly themselves.

Fourth, the institutional arrangements that link academics to the policy world mediate the demand and supply side of the policy arena. The nature of the so-called “science-policy interface” determines the nature of the brokerage of novel ideas towards policy questions. The strength of institutions and the formality of procedures determines the role of “pushy” personalities in driving policy forward. In the UK the nature of the links between academics

and government departments can be somewhat ad hoc, despite various academic panels.¹⁶ Broadly speaking, the same can be said for France. The UK had Pearce, France had Gollier, the Netherlands had institutions such that personalities were less important.¹⁷ In the US, the revolving door between the government and academia is enshrined on the Intergovernmental Personnel Act (IPA), and in the relationship between the EPA and Resources For the Future. It appears to us that institutions that broker input from all academics, not just the energetic and pushy personalities, play a valuable role. Research bulletins and regular meetings of academic and governmental panels provide examples.¹⁸

Fifth, real-world results are not necessarily what academics originally intended. The machinery of government will produce policy that diverges, for good and bad reasons, from the theory. This is true in the experience with discounting. Forward schedules in the United Kingdom were based on US not UK data and implemented in a highly-simplified manner. The reason was to reduce the cognitive load on civil servants. Nevertheless, the theory was implemented.

Do these changes in guidance have real-world impact? In the UK, overall budgets are determined politically, and projects subjected to CBA subsequently. The discount rate does not directly determine the size of government, otherwise we might expect the Prime Minister to have been present at meetings on discounting. But DDRs do change the portfolio of viable projects. According to our interviewees, this can affect inter-departmental bargaining power, hence the main arguments about discounting occur between departments. While the importance of DDRs can be overstated, they institutionalise long-term thinking and shift the mix of spending.

We would argue that the case of discounting provides an application of the framework that sees policy change as the intermediation of supply and demand in an “as if” market for ideas. Like any market, the ideas market can fail, and it is not necessarily the case that such a market leads to good ‘evidence-based policy making’. On the contrary, the demand side can lead to ‘policy-based evidence making’. The 2006 Deaton report accuses the World Bank of “trumpeting” and “proselytizing” early research on the effects of trade liberalisation on poverty while the jury was “very much still out” (Deaton et al. 2006, p52-54). Reinhart and Rogoff (2010) was similarly trumpeted by many governments pursuing austerity for growth, despite no claim of causality by the authors and well-documented arithmetic errors. Within our framework, both examples look like demand-side cherry-picking. The former may even have resulted from demand, supply and brokerage being housed in the same body. The latter from the perceived authority of the authors and the journal in which it was published. Checks and balances help, as does an unwillingness to defer to authority.

¹⁶ “Policy Advisors” fill this vacuum often, but the Ministry of Justice is an example of where formal arrangements exist: a regular research bulletin lists potential research gaps within the Ministry’s policy ambit (<https://www.gov.uk/government/publications/family-justice-research-bulletin-5-january-2015>). Similarly, up until 2013, the Department for International Development also had a “Growth Research News” website (<https://www.gov.uk/government/collections/research-news>).

¹⁷ The “energetic” and “pushy” individuals might be interpreted as exercising *power*. The UK and French cases look like minor applications of charismatic authority, and the Netherlands case one of rational-legal authority in policy making (Foucault, 1991).

¹⁸ According to our interviews, HMT will organise more annual updates of the Green Book, while in France proposals exist for a high-level panel to provide regular input on policy matters.

The deployment of DDRs may not have been invulnerable to such criticisms, but it seems that the arguments for DDRs have been more robust to the rigours of time. As a result, CBA has become less brutally short-term, at least for now.

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Appendix 1: Interviewees and positions

Semi-structured interviews were conducted in mid 2016 with a dozen relevant government officials and academics according to the interview guide in Appendix 2. The interviewees were as set out in the table below.

#	Name	Country	Institution during policy window
1	Joe Grice	UK	HM Treasury
2	Joeseeph Lowe	UK	HM Treasury
3	Robin Smale	UK	Oxera Ltd
4	Michael Spackman	UK	NERA Ltd
5	Christian Gollier	France	Toulouse School of Economics
6	Emile Quinet	France	Paris School of Economics - Ecole des Ponts ParisTech; Chair of “Quinet Commission”
7	Geir Avitsland	Norway	Ministry of Finance, Norway
8	Kare Hagen	Norway	NHH; Chair of Expert Committee reporting to Ministry of Finance, Norway
9	Herman Vollebergh	Netherlands	Netherlands Environmental Assessment Agency, University of Tilburg
10	Aart de Zeeuw	Netherlands	Department of Economics, University of Tilburg
11	Maureen Cropper	USA	Department of Economics, University of Maryland, Resources For the Future
12	William Pizer	USA	Council of Economic Advisers, Resources for the Future, Sanford School of Public Policy, Duke University.

Appendix 2: Interview guide

Ben Groom LSE



Cameron Hepburn



Interview structure

- 1) **Purpose of the research:** “We are studying the change in discounting policy in the Green Book that took place in 2003 and the HM Green Book Guidelines on CBA”.
- 2) **Confidentiality:** make sure this is clear: comments will be anonymous, not attributed to the institutions or the person unless you later agree to do so. List of people that we interview will be public.
- 3) **Informed consent:** explain what the interview is for and how the data are to be treated. Consent form? Oral consent form. Attached below
- 4) **Interview begins:**
 - a. Oral consent recorded
 - b. Questions asked
 - c. Notes taken

Semi-structured interviews on the Green Book

The UK Green Book guidelines on social discounting changed in 2003 to include a declining discount rate. We have some questions about this policy change and the HMT Green Book in general.

1. What has your role been in relation to the Green Book and this change in the guidance on discounting in 2003?
2. What were the key reasons for this change taking place in the 2003 update to the Green Book?
3. What was the role, if any, of academics and the academic literature leading up to this change?
4. Does academic research have any influence on government policy or guidance? if so, how do this happen?
5. What influence, if any, does the Green Book have?
6. Do you have any other comments on the role of Green Book and the role of Declining Social Discount Rates?

Table 1. Key articles in the R&D phase: Citations and policy references¹⁹

	Citations (Google Scholar)	Citations in Policy Documents
Arrow et al. (2013)	114	10*
Gollier (2002a)	281	1,3,4,5,6,7,8,9
Gollier (2002b)	201	1,3,4,5,6,7,8,9
Groom et al (2007)	131	1*,3,4,10
Groom et al (2005)	56	1*,3,4,8,10*
HMT (2003)	1445	3,4,7,8,10
Hepburn et al (2009)	51	3,4,10
Hoel and Sterner (2007)	143	9,10*
Lind (1982)	227	1
Newell and Pizer (2003)	386	1,3,4,8,9,10*
Pearce et al (2003)	203	3,4
Portney and Weyant (1999)	560	1*,2,3,4
Sterner and Persson (2008)	356	5,10*
Weitzman (2001)	860	1,3,4,5,6,7,8,9,10
Weitzman (1999)	135	1*,2,4,10
Weitzman (1998)	825	1,3,4,5,7,8,9,10

Key: 1 = The Green Book (HMT 2003); 2 = OMB (2003); 3 = Inter Agency Working Group (IAWG 2010), 4 = USEPA (2010); 5 = Lebègue (2005), 6 = The Gollier Report (Gollier, 2011), 7 = The Quinet Report (Quinet, 2013); 8 = Pearce et al (2006). 9 = Norwegian Guidelines (NMOF, 2012), 10 = CPB (2015) (Dutch Guidelines); * means cited via presentation or consultancy report: 1* = cited via Oxera (2002); 10* = cited in presentation to Dutch Government.

¹⁹ As of 13th December 2016.

Figures

Figure 2: Key Personalities, Papers and Presentations in the Process of Policy Change

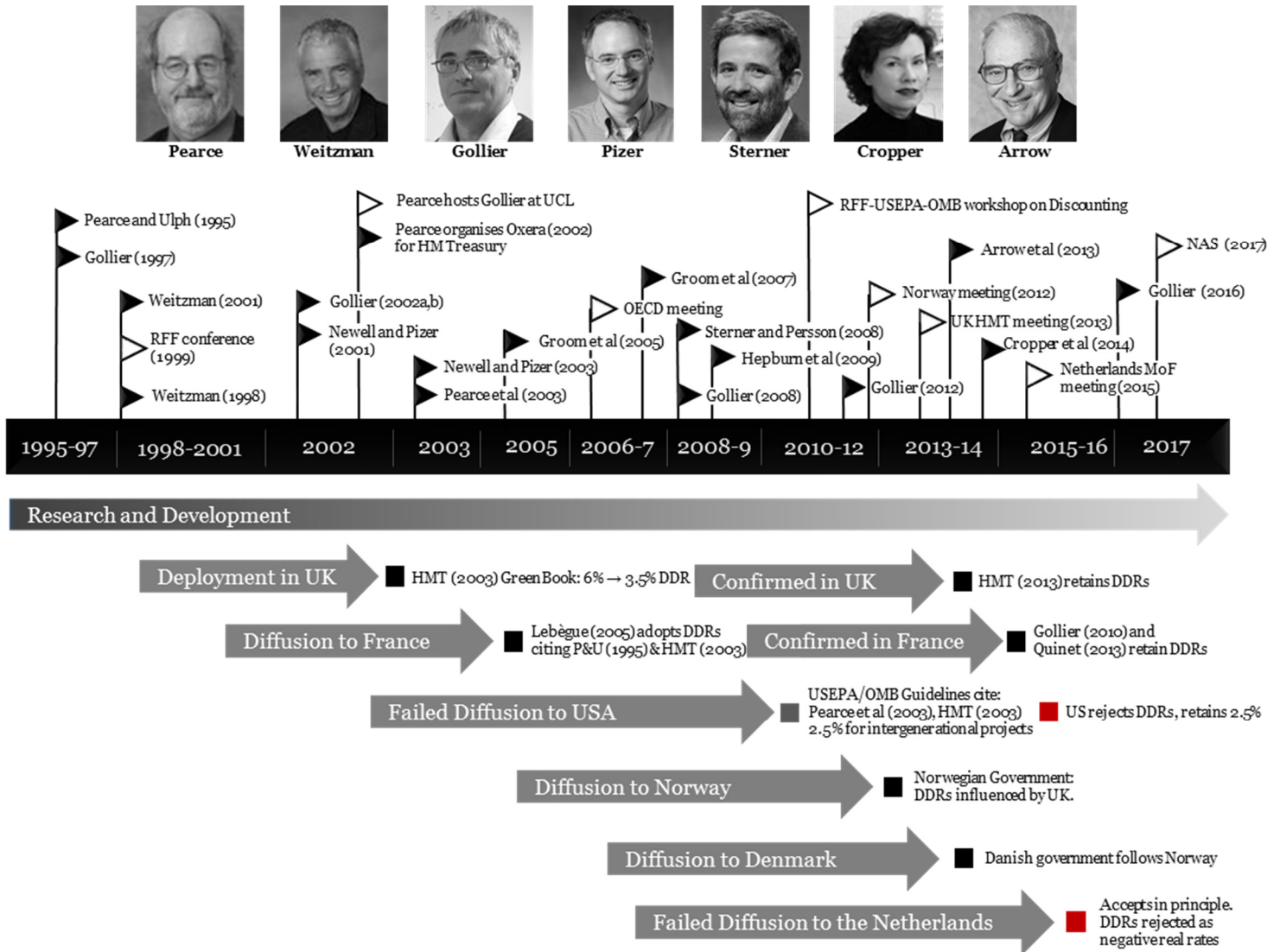
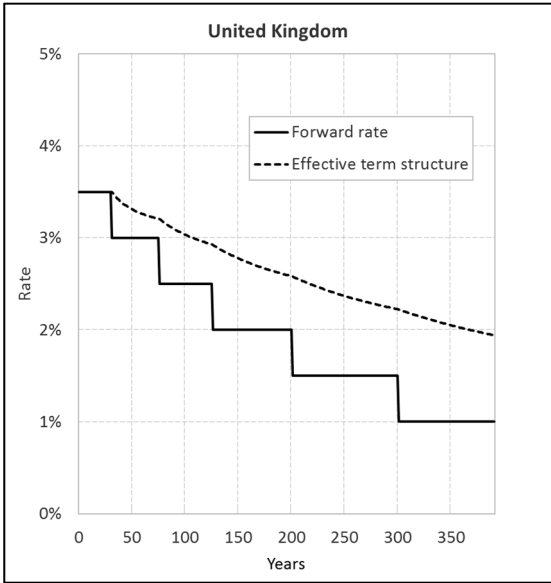
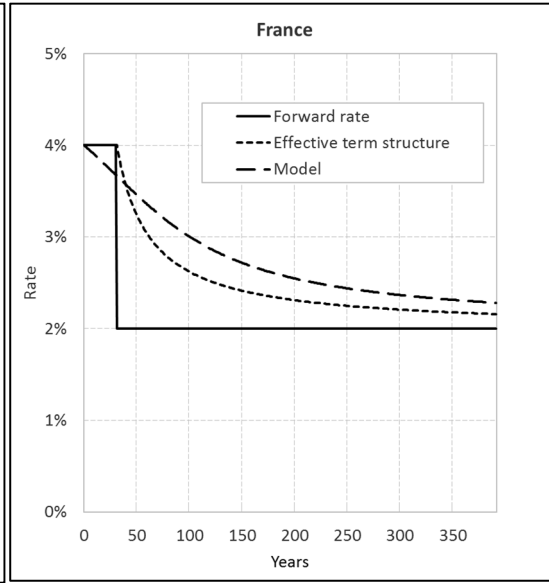


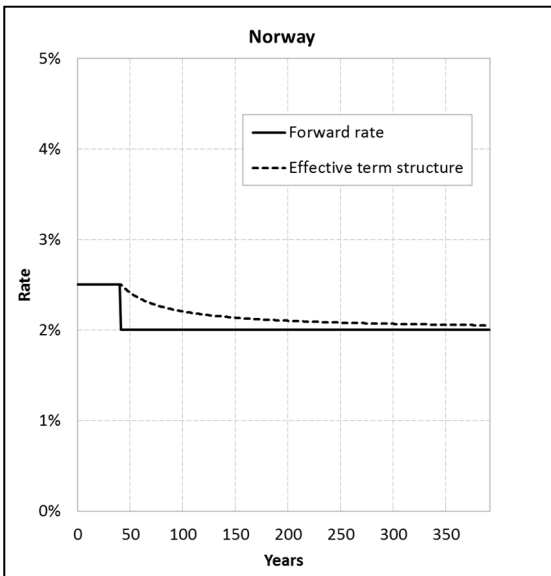
Figure 1: Declining Social Discount Rate Schedules for (a) United Kingdom; (b) France; (c) Norway; (d) United States of America



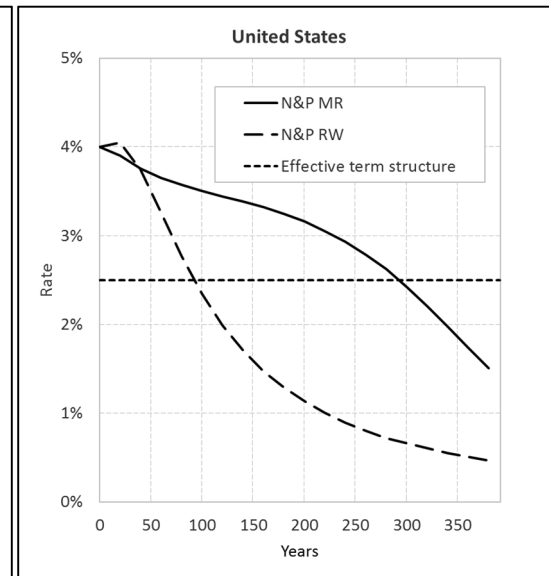
(a)



(b)



(c)



(d)